

Safedock®

User Guide for Pilots





"We have been using Docking Guidance Systems since 1988. We will definitely continue to do so at the new gates we're planning to build. The reason we're concentrating on a docking system is due to the fact that it gives us the possibility to effectively take care of the increasing volumes we're experiencing here, without creating bottlenecks at the gates. Over the past two years, there has been a 20% increase in volume and everything suggests that this trend will be maintained. The reason why Safedock, in particular, previously has been chosen, is because we found it to be the most superior system on the market."

Leopold Kitzler, Vienna Airport,
Vienna, Austria.



SAFEDOCK®

USER GUIDE FOR PILOTS

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1. INTRODUCTION

1.1 SAFEDOCK

The Safedock Advanced-Visual Docking Guidance System (A-VDGS) provides both pilots with guidance for manoeuvring the aircraft into the gate to the correct centreline and stop-position under all operational conditions. A Safedock includes a built-in computer integrated to a low-intensity infrared laser that scans the gate area for the approaching aircraft. Safedock locks onto the aircraft to determine nose, engine, and wing positions to guide it to its park position. During the docking, Safedock also performs a safety check for a positive match of the inbound aircraft type, docking is interrupted if there is a mismatch.

Airport operations requirements include an optimum use of existing airport space, management of an ever changing mix of aircraft in airline fleets as well as safety and efficiency.

1.2 DOCUMENTATION

This document has been compiled to give the reader a quick understanding of operation procedures, with a focus on safety and efficiency. It is also an overview of the Pilots Display messages that may appear on the most common Safedock Types (T1, T2, T3), installed at numerous airports around the world.

The distances are provided in metric (metres) and imperial (feet) values, where 1 metre = 3.3 feet approximately and 1 foot = 0.3 metre approximately.

Note: *It is recommended to print this information as a double-sided document or as a booklet, to show texts to the left (even page) and images to the right (odd page).*

For more detailed information, see the Safedock Manual or www.safegate.com.

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History

Version	Date	Description
1.0	January 2008	First Release (Single type option)
1.1	July 2008	All type options
1.2	January 2009	Type options compared
1.3	May 2009	General update
1.4	September 2009	Feature update
1.5	January 2010	Feature update
1.6	June 2010	Feature update
1.7	November 2010	Minor update
1.8	April 2011	Minor update
1.9	June 2011	T2, T3 LED update
1.10	April 2012	Drawings update

Note: *This page is to be updated with every authorised change to the document.*

2. SAFETY INFORMATION

Safedock Advanced-Visual Docking Guidance System is an aircraft parking aid for airport and aircraft safety and efficiency. The design is according to strict airport industry standards for the safety of, and use by authorised airport personnel.

2.1 GENERAL WARNING

The Safedock has a built-in error detection program to inform the aircraft pilot of impending dangers during the docking procedure.



WARNING! IF A PILOT IS UNSURE OF THE INFORMATION BEING SHOWN ON THE SAFEDOCK DISPLAY UNIT, HE MUST IMMEDIATE STOP THE AIRCRAFT AND OBTAIN FURTHER INFORMATION FOR CLEARANCE.

2.2 ITEMS TO CHECK BEFORE ENTERING THE STAND AREA



WARNING! A PILOT SHALL NOT ENTER THE STAND AREA, UNLESS THE DOCKING SYSTEM FIRST IS SHOWING THE VERTICAL RUNNING ARROWS. THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE, UNLESS THESE ARROWS HAVE BEEN SUPERSEDED BY THE CLOSING RATE BAR.



WARNING! A PILOT SHALL NOT ENTER THE STAND AREA, UNLESS THE AIRCRAFT TYPE DISPLAYED IS EQUAL TO THE APPROACHING AIRCRAFT. THE CORRECTNESS OF OTHER INFORMATION, SUCH AS 'DOOR 2', SHALL ALSO BE CHECKED.


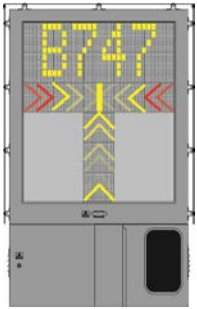
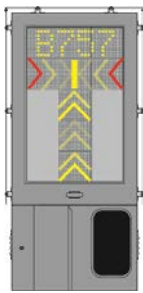
2.3 THE SBU MESSAGE

The message STOP SBU means that docking has been interrupted and has to be resumed only by manual guidance. DO NOT TRY TO RESUME DOCKING WITHOUT MANUAL GUIDANCE.

Note: This information for Pilots must be distributed to all airlines using the systems.

3. SAFEDOCK TYPES

A Safedock system includes display types as options: T1-XX, T2-XX, T3-XX (T - types), XX – (number of LEDs).

Pilots Display (PD)	Type 1-42	Type 2-18	Type 3-9
<p>A single cabinet housing a number of units: display (including LEDs), a laser scanner, control and power units.</p> <p>The unit is mounted 4-8 metres above ground and provides multiple functionality, for example clear pilot instructions, accurate aircraft identification and tracking, as well as quick and easy access to this low maintenance unit.</p>			
FIGURE T1-42, T2-18, T3-9 CAPTURE			

3.1 FUNCTIONS AND OPTIONS

Each display type also includes functions with more options available for specific site requirements.

Functions and Options		
START-OF-DOCKING	DOCKING COMPLETED	SBU-STOP
CAPTURE	OVERSHOOT	TOO FAST
TRACKING	STOP SHORT	EMERGENCY STOP
CLOSING RATE	WAIT	CHOCKS ON
ALIGNED TO CENTRE	AIRCRAFT VERIFICATION FAILURE	ERROR
SLOW	GATE BLOCKED	SYSTEM BREAKDOWN
AZIMUTH GUIDANCE*	VIEW BLOCKED	POWER FAILURE
STOP POSITION REACHED		
Note: The symbol * indicates available options.		

Note: This document includes options for the distance counts available for display types, in metres and feet. Each option is a specific distance count and not intended as a conversion between metres and feet.

4. SAFEDOCK PROCEDURES

Note: The following functions and/or options are available for Safedock types (Pilots Displays). Safedock types with other configurations may exist as some airports and may therefore differ from the images used in this document. All display images in this document are subject to modification by Safegate Group/Thorn Airfield Lighting. The descriptions that follow correspond to the respective image examples on the opposite/next page.

4.1 START-OF-DOCKING

The system is started by pressing one of the aircraft type buttons on the Operator Panel. When the button has been pressed, WAIT will be displayed.

4.2 CAPTURE

The floating arrows indicate that the system is activated and in capture mode, searching for an approaching aircraft.

It shall be checked that the correct aircraft type is displayed. The lead-in line shall be followed.

THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE, UNLESS THE ARROWS HAVE BEEN SUPERSEDED BY THE CLOSING RATE BAR.

4.3 TRACKING

When the aircraft has been caught by the laser, the floating arrow is replaced by the yellow centre line indicator.

A flashing red arrow indicates the direction to turn.

The vertical yellow arrow shows position in relation to the centre line. This indicator gives correct position and azimuth guidance.

4.4 CLOSING RATE

The closing rate is the final countdown from a specific distance to the stop position. A yellow vertical closing rate bar/centre line indicator appears with or without a digital countdown, depending on the configuration.

The closing rate bar represents the distance from stop, it consists of a number of rows representing for example 0.3 m or 0.6 m per row, depending on the configuration requirements. Each row turns off as the aircraft approaches stop (reducing the length of the bar, bottom upwards) and as the last row turns off, less than the interval for one row remains until **STOP** appears.

A digital countdown (option) shows the distance to stop numerically, for example starting from 9, 12 (40 feet), 15, 20 or 30 m, depending on the configuration requirements.

The digital countdown also uses different decrements during the closing rate process.

- Metric digital count example
Starting with 1 metre decrements from 20 m down to 3 m followed by 0.2 metre decrements from 3.0 down to 0.2 m and then followed by STOP.
- Imperial digital count example
Starting with 4 feet decrements from 40 ft down to 12 ft followed by 1 foot decrements from 8 ft down to 1 ft and then followed by STOP.

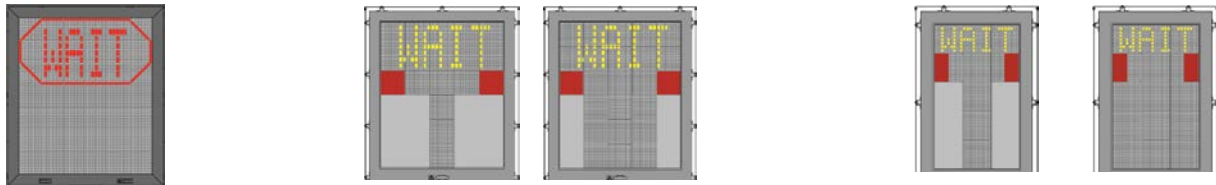
The pictures illustrate aircraft in the closing rate distance from stop position, slightly left of the centre line. The red arrow indicates the direction to steer.

Note: Some pictures are units with centre line symbol countdown only - no digital count (NDC).

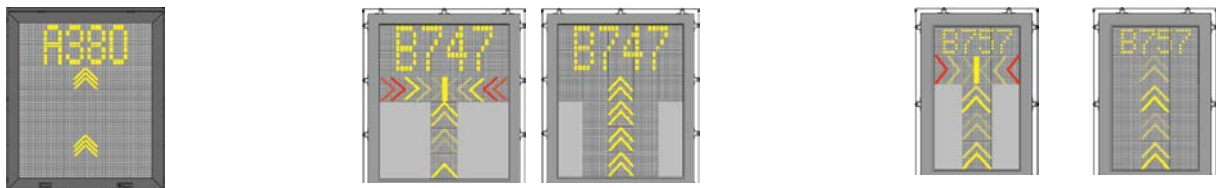
T1-42		T2-18	T2-24		T3-9	T3-15
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Note: Pilots Display figure/image examples are subject to modification by SAFEGATE.

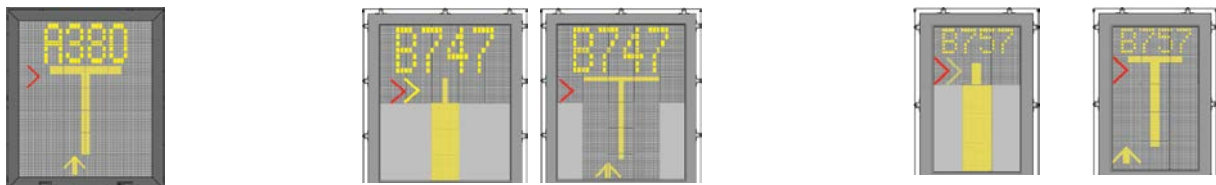
4.1 START-OF-DOCKING



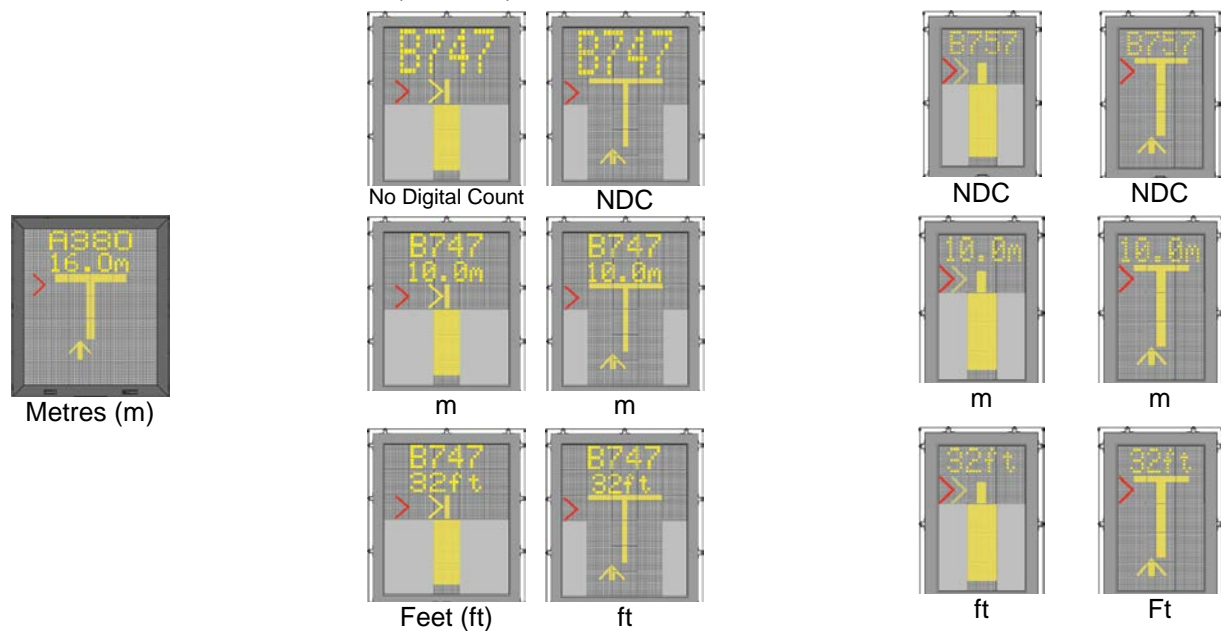
4.2 CAPTURE



4.3 TRACKING



4.4 CLOSING RATE (OPTION)



4.5 ALIGNED TO CENTRE (OPTION)

The aircraft is at the displayed distance from the stop position. The absence of any direction arrow indicates an aircraft on the centre line.

4.6 SLOW (DECREASE SPEED)

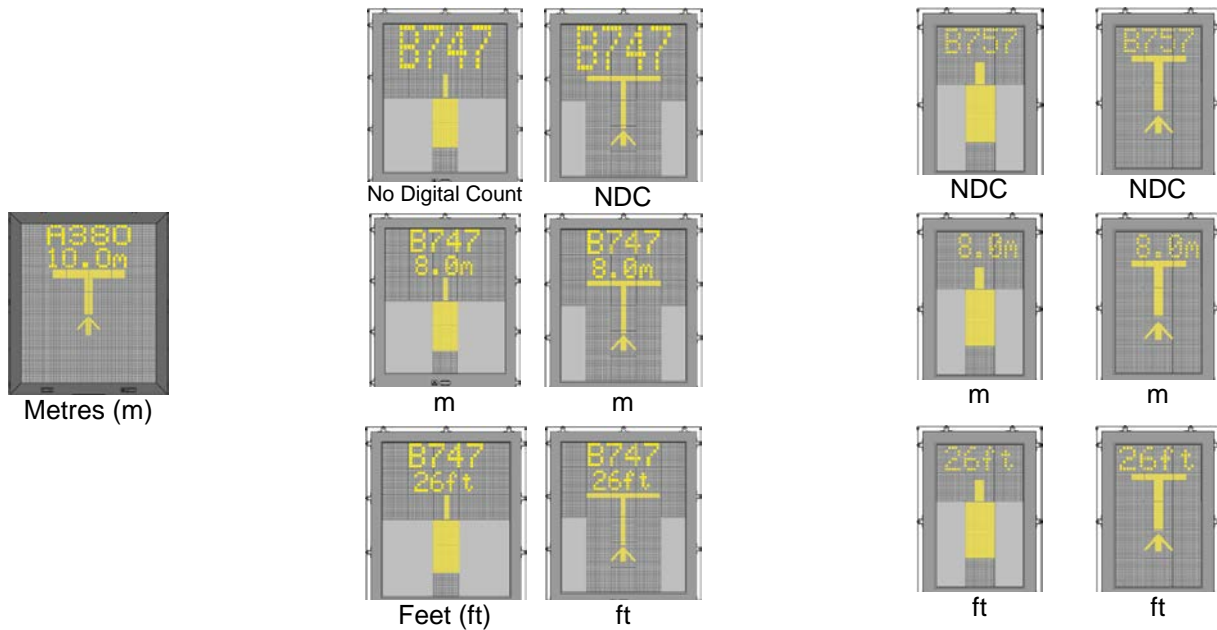
Safedock is configured with a slow down active zone (optional distances set from the stop position, standard 6-24 metres) according to an acceptable docking speed (optional max allowed speed, standard 2 m/s).

Note: When 2 m/s is rounded down to a single digit, it is approximately 7 km/h, 4 mph or 3 knots.

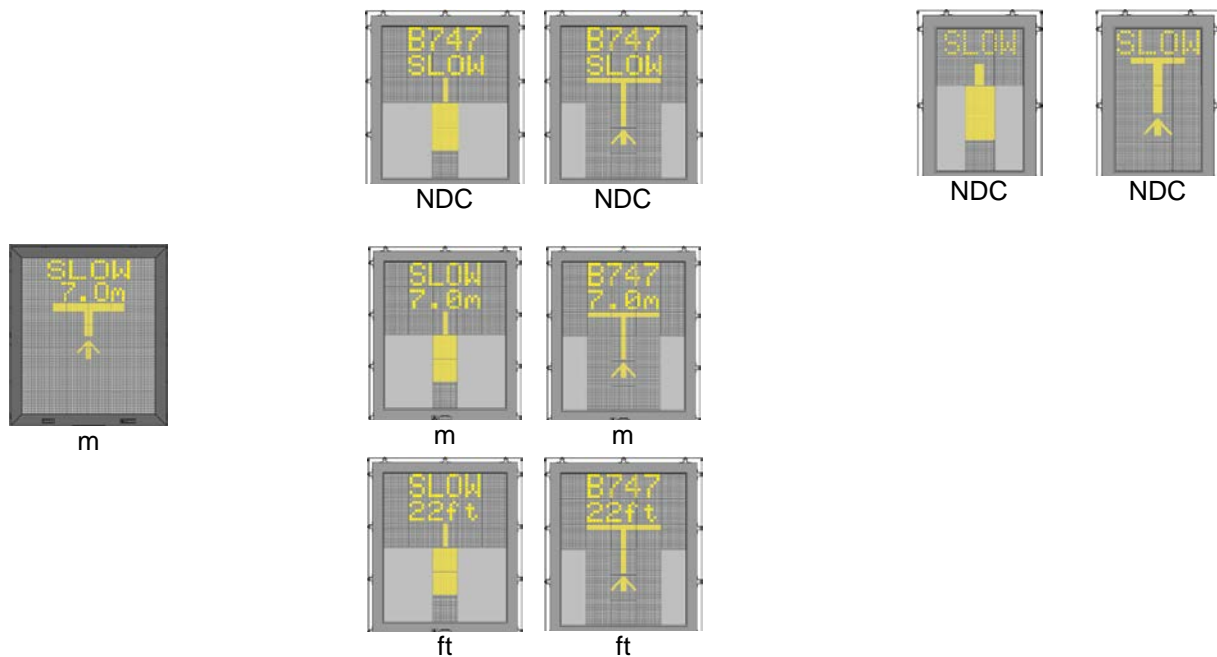
If the aircraft is approaching faster than the accepted speed, the system will show SLOW as a warning to the pilots.

T1-42		T2-18	T2S-24		T3-9	T3-15
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4.5 ALIGNED TO CENTRE (OPTION)



4.6 SLOW (DECREASE SPEED)



4.7 AZIMUTH GUIDANCE (OPTION)

The aircraft is at the displayed distance from the stop-position. The yellow arrow indicates an aircraft to the right of the centre line, and the red flashing arrow indicates the direction to turn.

4.8 STOP POSITION REACHED

When the correct stop-position is reached, the display will show STOP with a red border or with red lights.

4.9 DOCKING COMPLETED

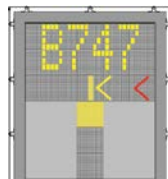
When the aircraft has parked, OK will be displayed.

T1-42		T2-18	T2S-24		T3-9	T3-15
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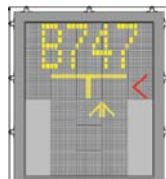
4.7 AZIMUTH GUIDANCE (OPTION)



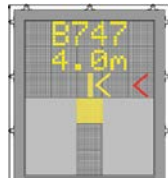
Metres (m)



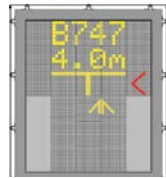
No Digital Count



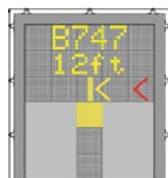
NDC



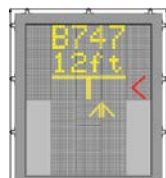
m



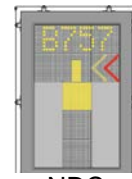
m



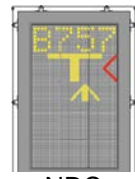
Feet (ft)



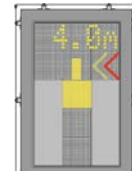
ft



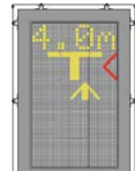
NDC



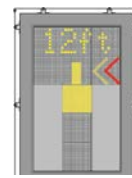
NDC



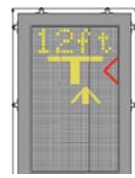
m



m

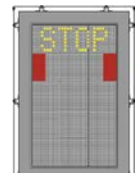
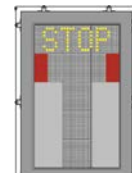
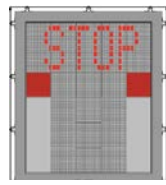
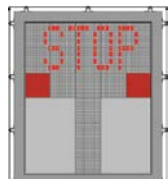
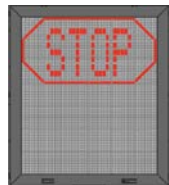


ft

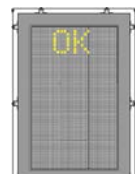
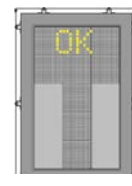
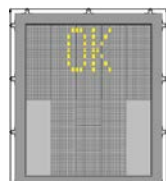
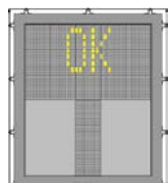


ft

4.8 STOP POSITION REACHED



4.9 DOCKING COMPLETED



4.10 OVERSHOOT

If the aircraft has overshoot the stop-position, TOO FAR will be displayed.

4.11 STOP SHORT

If the aircraft is found standing still but has not reached the intended stop position, the message STOP OK will be shown after a pre-configured time.

4.12 WAIT

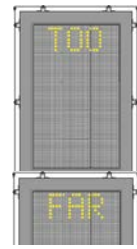
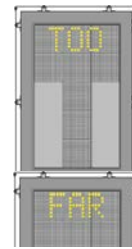
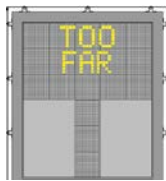
If some object is blocking the view toward the approaching aircraft or the detected aircraft is lost during docking close to STOP, the display will show WAIT.

The docking will continue as soon as the blocking object has disappeared or the system detects the aircraft again.

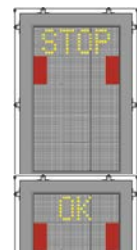
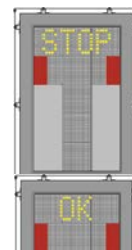
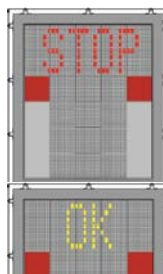
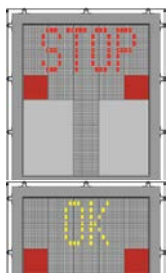
THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE, UNLESS THE "WAIT" MESSAGE has BEEN SUPERSEDED BY THE CLOSING RATE BAR.

T1-42		T2-18	T2S-24		T3-9	T3-15
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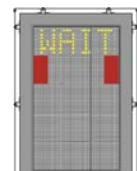
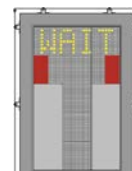
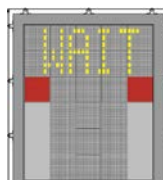
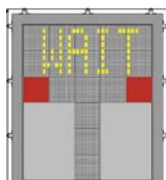
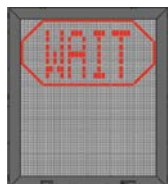
4.10 OVERSHOOT



4.11 STOP SHORT



4.12 WAIT



4.13 SLOW (IN ABNORMAL SITUATIONS)

This display can be shown for two reasons:

A) BAD WEATHER CONDITION

During heavy fog, rain or snow, the visibility for the docking system can be reduced.

When the system is activated and in capture mode, the display will disable the floating arrows and display SLOW and the Aircraft Type.

As soon as the system detects the approaching aircraft, the vertical closing rate bar will appear.

If the system has been configured in this mode to make a shortened ID verification (check of engine position excluded), the Aircraft symbol will blink to give attention.

B) AIRCRAFT LOST DURING DOCKING

If the aircraft is lost during docking far out from the bridge or PBB area, the display will show SLOW.

As soon as the system detects the approaching aircraft, the vertical closing rate bar will re-appear.

THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE, UNLESS THE CLOSING RATE BAR IS SHOWN.

4.14 AIRCRAFT VERIFICATION FAILURE

During entry into the Stand, the aircraft geometry is being checked.

T1: If, for any reason, aircraft verification is not made 12 metres before the stop-position, the display will first show WAIT and make a second verification check. If this fails STOP and ID FAIL will be displayed.

T2, T3: If, for any reason, aircraft verification is not made according to the distance option or 12 metres or 40 feet before the stop-position, the display will first show WAIT and make a second verification check. If this fails STOP and ID FAIL will be displayed. The text will be alternating on the upper two rows of the display.

THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE WITHOUT MANUAL GUIDANCE, UNLESS THE WAIT MESSAGE HAS BEEN SUPERSEDED BY THE CLOSING RATE BAR.

4.15 GATE BLOCKED

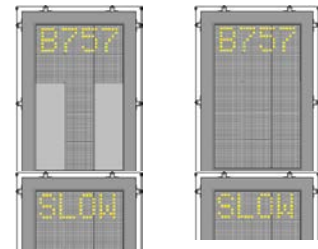
If an object is found blocking the approach to gate/apron view from the Safedock to the planned stop position for the aircraft, the docking procedure will be halted with a WAIT and GATE BLOCK message.

The docking procedure will resume as soon as the blocking object has been removed.

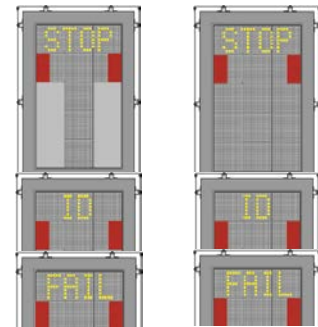
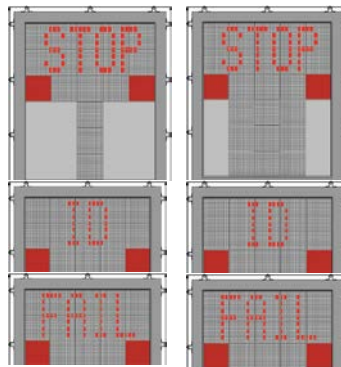
THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE WITHOUT MANUAL GUIDANCE, UNLESS THE WAIT MESSAGE HAS BEEN SUPERSEDED BY THE CLOSING RATE BAR.

T1-42		T2-18	T2-24		T3-9	T3-15
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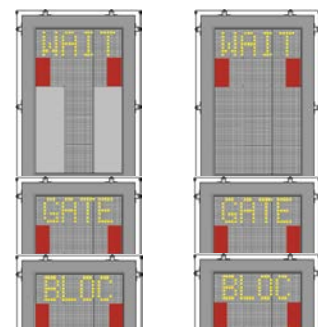
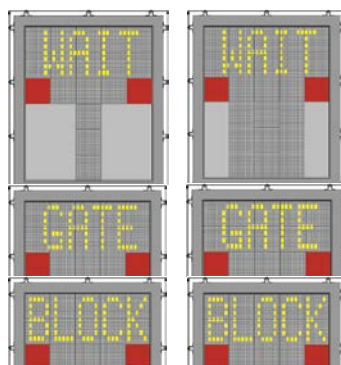
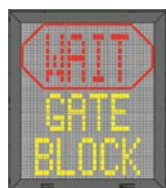
4.13 SLOW (IN ABNORMAL SITUATIONS)



4.14 AIRCRAFT VERIFICATION FAILURE



4.15 GATE BLOCKED



4.16 VIEW BLOCKED

If the view towards the approaching aircraft is hindered, for example internally in the unit on the laser lens or on the laser window by dirt, or another obstacle in the closest view area, the Safedock will report a View blocked condition. Once the system is able to see the aircraft through the hinder, the message will be replaced with a closing rate display.

THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE WITHOUT MANUAL GUIDANCE, UNLESS THE WAIT MESSAGE HAS BEEN SUPERSEDED BY THE CLOSING RATE BAR.

4.17 SBU STOP

Any unrecoverable error during the docking procedure will generate an SBU (safety back-up) condition. The display will show the text STOP SBU.

A MANUAL BACKUP PROCEDURE MUST BE USED FOR DOCKING GUIDANCE.

4.18 TOO FAST

If the aircraft approaches with a speed higher than the docking system can handle, the message STOP TOO FAST will be displayed.

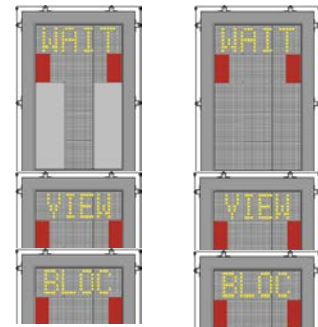
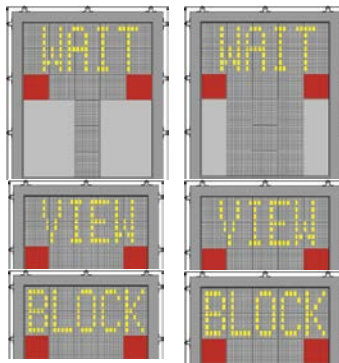
The docking system must be re-started or the docking procedure completed by manual guidance.

4.19 EMERGENCY STOP

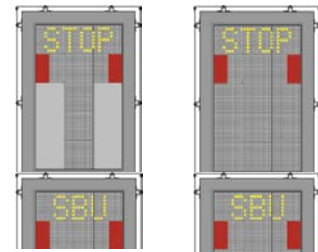
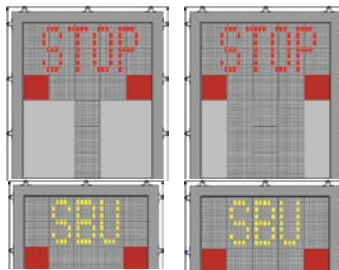
When the Emergency Stop button is pressed, STOP is displayed.

T1-42	T2-13	T2-18	T2S-24	T2S-27	T3-9	T3-15
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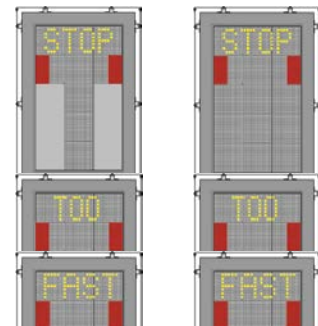
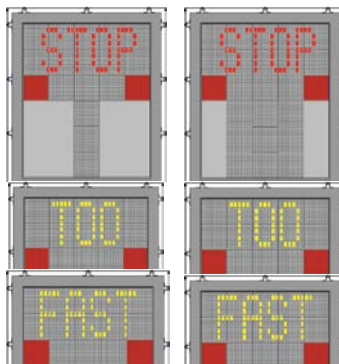
4.16 VIEW BLOCKED



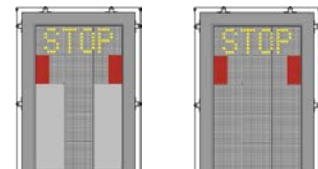
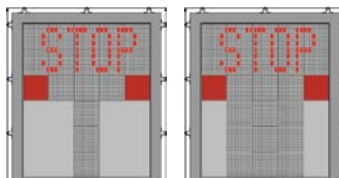
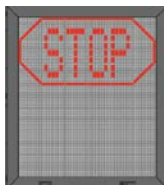
4.17 SBU-STOP



4.18 TOO FAST



4.19 EMERGENCY STOP



4.20 CHOCKS ON (OPTION)

CHOCK ON will be displayed, when the ground staff has put the chocks in front of the nose wheel and pressed the “Chocks On” button on the Operator Panel.

4.21 ERROR

If a system error occurs, the message ERROR is displayed with an error code. The code is used for maintenance purposes and explained elsewhere.

4.22 SYSTEM BREAKDOWN

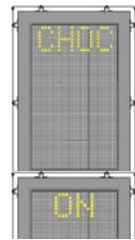
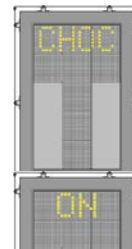
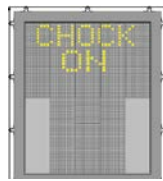
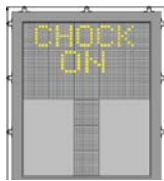
In case of a severe system failure, the display will go black. A manual backup procedure must be used for docking guidance.

4.23 POWER FAILURE

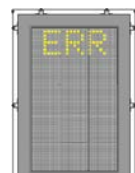
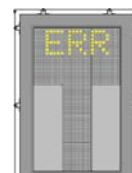
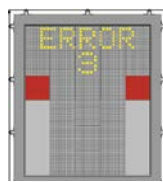
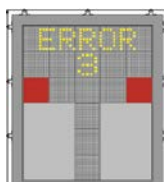
In case of a power failure, the display will be completely black. A manual backup procedure must be used for docking guidance.

T1-42		T2-18	T2S-24		T3-9	T3-15
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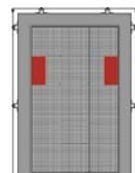
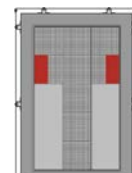
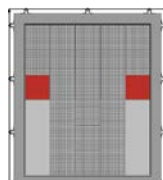
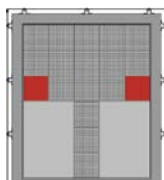
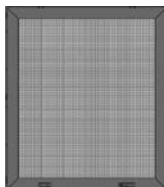
4.20 CHOCKS ON (OPTION)



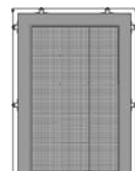
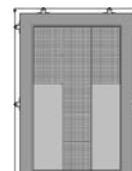
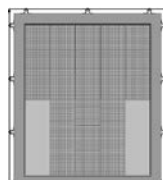
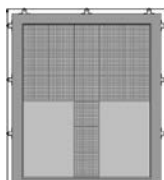
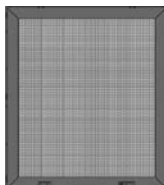
4.21 ERROR



4.22 SYSTEM BREAKDOWN



4.23 POWER FAILURE



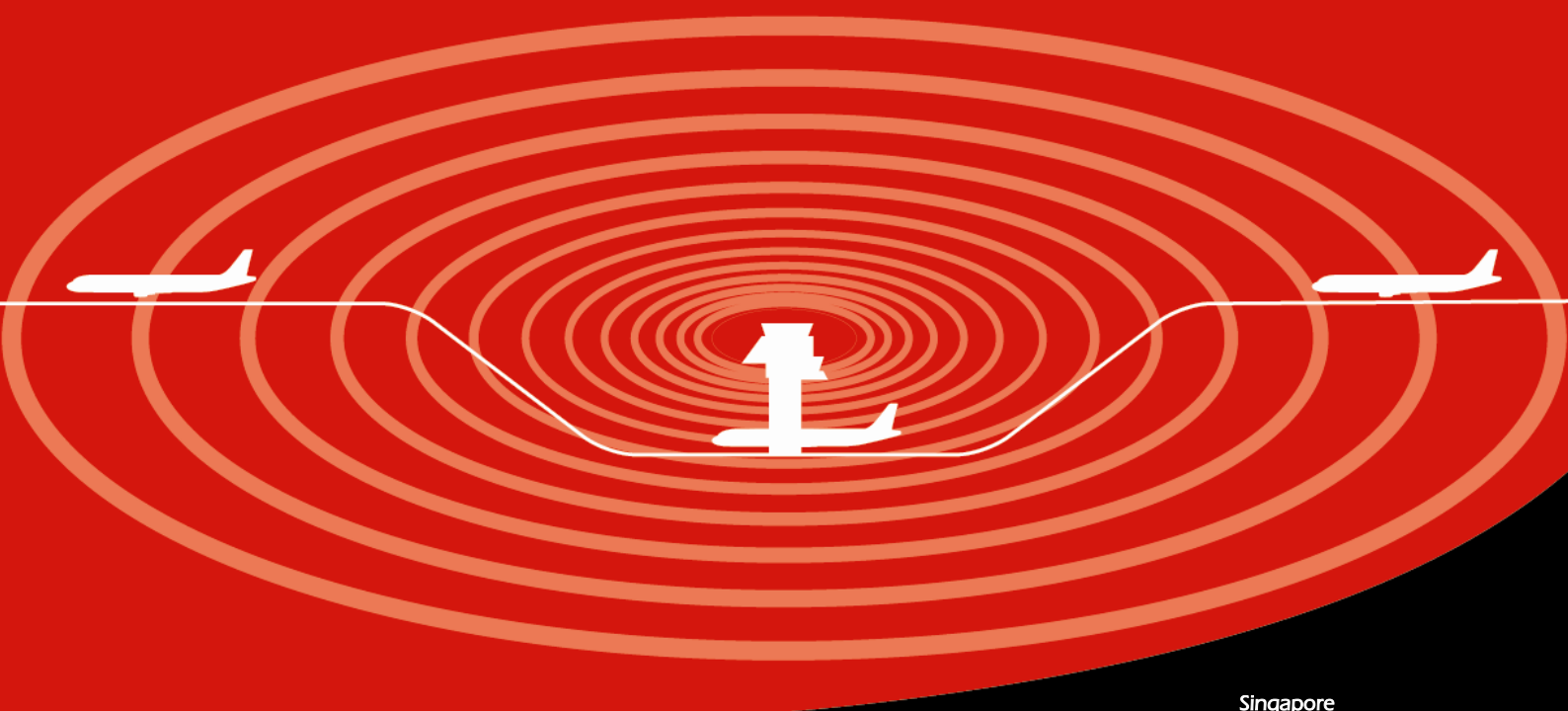
Note: *This page is blank for convenient double-sided printing.*

Check in to the future

How many aircraft can your airport handle today? Can this number be increased without adverse effects on the airport's safety level? It is a known fact that traffic volume will rise in the foreseeable future. More movements will demand monitoring of the entire airport. Requirements will be sharpened and the development of an integrated system

controlling not only ground movements but also air traffic close to the airport is of the highest interest. The International Civil Aviation Organization (ICAO) already describes A-SMGCS, Advanced Surface Movement Guidance and Control System, as the answer to the future modern airport need to control the entire airport space in one superior system.

To a larger extent than today's systems, A-SMGCS will rely on automated processes to give both pilots and traffic controllers exact information about positions and directions. Safegate Group delivers complete A-SMGCS solutions already, as well as all vital parts relating to it. Safegate Group can check your airport into the future – today!



Safegate Group HO
Djurhagegatan 19
SE-213 76 Malmö, Sweden
Phone: +46 (0)40 699 17 00
Fax: +46 (0)40 699 17 30
E-mail: market@safegate.com

Australia
australia@safegate.com
+61 (0)3 9720-3233

China
china@safegate.com
+8610-85275297

Dubai
dubai@safegate.com
+971 4 332 30 07

Finland
finland@safegate.com
+358 (0)20754 7700

France
france@safegate.com
+33 (0)1 49 53 62 62

Germany
germany@safegate.com
+49 (0)231 9776754

India
india@safegate.com
+91 11 4106 1545

Malaysia
malaysia@safegate.com
+60 16 551 7126

Qatar
qatar@safegate.com
+974 436 9628

Russia
russia@safegate.com
+7 495 917 4614

Singapore
singapore@safegate.com
+65 6289 6893

Spain
spain@safegate.com
+34 917 157 598

UK
uk@safegate.com
+44 (0)208 573 0384

USA
usa@safegate.com
+1 763 535 92 99

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